

Fin

D'Aron Power,
10a, Cavendish Sq.,
Cavendish Sq., W.

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SOME CASES ILLUSTRATING THE SURGERY OF THE SPLEEN.

BY

D'ARCY POWER, F.R.C.S.

Every surgeon with much hospital experience in a large city meets with obscure abdominal cases, the obscurity depending in some instances on the complexity of the symptoms, in others upon the rarity of the organ affected. The kidney and appendix are often diseased, and yet they are fruitful sources of obscure abdominal cases owing to the complexity of the symptoms they present; whilst the spleen and the retroperitoneal connective tissue produce obscure cases because they are only rarely the seat of disease or injury, and the surgeon does not take them into account in his differential diagnosis.

During the last few years I have had occasion to treat several patients for disease and injury of the spleen, and as nearly all the cases occurred in hospital practice I thought that a brief account of these cases might fairly appear in the St. Bartholomew's Hospital Reports. I offer them, therefore, with very brief comments.

CASE I.—*Removal of an Enlarged and Displaced Spleen— Patient Alive and Well Nine Years Afterwards.*

History.—A widow, aged 42, mother of two children, the youngest being 25, consulted my colleague, Dr. W. S. A. Griffith, on account of an abdominal tumour which was thought to be ovarian. Examination showed that the uterus and its appendages were normal, and the patient was committed to my care. She said that three years and a half previously she had struck her left side just over the lower ribs whilst she was moving a heavy piece of furniture. She dated the beginning of her abdominal discomfort very definitely to the time of this injury, but it was not until two years later that she noticed the increase in

size in the lower part of her abdomen. The swelling had caused her much pain and inconvenience during the last twelve months. She had suffered from attacks of indigestion and vomiting, but she had not lost flesh.

Anamnesis.—The patient was a healthy-looking woman with a florid complexion. She complained less of the inconvenience of the tumour than of the remarks to which it gave rise, for her abdomen was as large and prominent as it had been during the sixth and seventh months of her former pregnancies. Examination of the abdomen showed a large tumour filling up the whole of the left side and extending to the right of the umbilicus. The surface was smooth, and there was a definite edge, notched at the lower part. The tumour was freely movable from side to side, but any attempt to push it upwards caused pain, and the swelling was said to be tender at the upper part just beneath the ribs. The tumour was dull on percussion in the flanks, but resonant in front where the intestines lay over it.

Operation.—I opened the abdomen on September 5, 1899, making a 5-inch incision in the left linea semilunaris. The spleen was easily delivered from the abdominal cavity, and was found to measure 8 inches in length. It was attached by so long a pedicle that it hung free by the side of the patient and almost lay upon the operating table. The patient showed signs of collapse when the pedicle was stretched in this manner, but recovered as soon as the spleen was supported. The pedicle measured 4 inches across, and consisted of fatty connective tissue with many large veins; the tortuous splenic artery was easily seen lying in the centre.

The connective tissue overlying the artery was carefully dissected away, and the vessel was secured with a double silk ligature before it was divided. The pedicle was then ligatured in $\frac{1}{2}$ -inch segments from below upwards, and was divided. The cut end of the pedicle was carefully examined to ascertain whether any vessel had escaped ligature, and the operation was delayed nearly ten minutes until I had satisfied myself that there was no oozing. When everything seemed secure the stump of the pedicle was returned to the abdomen. The suspensory ligament was only represented by a little loose connective tissue, and gave no trouble as it was secured by a single ligature of silk. The wound was closed by a continuous suture of fine silk, interrupted sutures of catgut through the abdominal muscles and aponeurosis of the external oblique, and a continuous suture of silkworm gut through the skin.

After History.—The patient bore the operation excellently,

her pulse being 96 and of good volume after she had been put to bed. From the time of the operation until the fifth day the patient presented evidence of some irritation of the sympathetic nervous system in a curiously agonised expression, of which she was quite unaware, reminding one of those who suffer from abdominal cancer or of commencing tetanus. The facies seemed to be due to a slight tonic contraction of the platysma and its connections, but in no other way was there evidence of sympathetic disturbance, and the patient was quite cheerful.

She remained comfortable for many days, with a normal temperature and a pulse of 64. The stitches were removed on the seventh day, when the wound was healed, except for a small stitch abscess at the lower part, which had disappeared on the ninth day.

The patient progressed satisfactorily until September 28—the twenty-second day after the operation—when her temperature began to rise. Two days later she was suddenly seized with intense pain in her left side, the action of her heart and diaphragm were impeded, and she was thought to be dying. The symptoms, which were alarming for a time, passed off spontaneously and were succeeded by a similar attack two days later. They proved to be the heralds of a subdiaphragmatic abscess which was opened by an incision carried parallel to the scar of the original wound and 2 inches to its outer side. There was free bleeding for several days afterwards, apparently from an artery at the bottom of the abscess cavity; pus was discharged by the bowel, and a fæcal fistula formed. The fistula soon closed, leaving only a small sinus through which silk ligatures came away from time to time. The general condition of the patient remained good; she increased in weight, her temperature became normal, and she went home on October 18—the forty-second day after the operation.

The patient came under my care again during the month of November 1901—more than two years after her spleen had been removed—for the cure of an ulcer of the leg. The sore was situated over the upper part of the tibia. It healed whilst she took iodide of potassium, and ceased to heal when this drug was discontinued.

She appeared at this time to be well nourished, of a ruddy complexion, quite cheerful and able, in every way, to follow her usual occupation and enjoy her life. The original line of incision through which the spleen was removed was almost imperceptible, but there was a depressed scar at the point where the fæcal fistula had discharged itself, and to this point

she referred some occasional dragging pain, due, no doubt, to the presence of adhesions. Dr. F. W. Andrewes examined a sample of the urine she passed in twenty-four hours, and reported that it contained a considerable quantity of proteolytic ferment like pepsin, but he was unable to ascertain whether any pancreatic ferment was present.

Description of the Spleen Removed.—The spleen was estimated to weigh about 40 ounces immediately after the operation and whilst it was full of blood. It weighed between 17 and 18 ounces after it had been kept in spirit for six months. A microscopical examination showed that there were no new elements present, and that the enlargement was due to simple hypertrophy.

Blood Examination.—Dr. J. H. Drysdale, who kindly examined the blood of the patient on September 14, 1899—the eighth day after the operation—reported: “Hæmoglobin, 69 per cent.; red cells, 4,230,000; number of leucocytes, 17,000; lymphocytes, 18.75 per cent.; large mononuclear, 12.5 per cent.; polymorphonuclear, 65.5 per cent.; eosinophile, 3.5 per cent. There were no myelocytes or atypical cells. The blood was taken before the midday meal, the patient having had a boiled egg, toast, and coffee for breakfast, with lamb, vegetables, and a fried sole on the previous day. *Remarks.*—Leucocytes, the large lymphocytes (mononuclear) relatively as well as positively increased.”

Fifty months later, in November 1901, Dr. Drysdale again examined the blood of this patient and found it practically normal, for it contained: red corpuscles, 4,800,000; white corpuscles, 11,000; neutrophile corpuscles, 64.5 per cent.; lymphocytes, 28 per cent.; large mononuclear corpuscles, 4 per cent.; eosinophile corpuscles, 3 per cent.; a single basophile corpuscle was seen during the blood count.

The patient moved from London to Brighton. She came to see me in good health and spirits in the summer of 1903, and again in May 1908. She said on the last occasion—nearly nine years after the splenectomy—that she felt no inconvenience at all in her abdomen and that she was as well as she had ever been in her life.

Looked at in the light of subsequent events—the subphrenic abscess forming at the end of three weeks, the ulceration of the pedicle, and the ulcer of the leg which healed under iodide of potassium—I have no hesitation in classifying the enlargement of the spleen, from which this patient suffered, under the heading of syphilitic hypertrophy. The spleen had been painlessly increasing in size for some time, and it was accidentally

displaced by the injury which first drew the attention of the patient to her left side. Removal of the spleen proved to be a satisfactory treatment; but if I had to treat a similar condition I should certainly endeavour to reduce the size of the organ by a course of mercury and potassium iodide before resorting to splenectomy.

CASE II.—*Removal of the Spleen for Primary Sarcoma—
Death Six Months Later.*

A married woman, aged 49, was admitted into St. Bartholomew's Hospital under my care on October 30, 1905, complaining of pain and swelling in the abdomen.

Anamnesis.—The patient stated that in March 1905 she was seized suddenly with a pain in the left side of her abdomen. The pain came on just after a meal, and was felt chiefly on the left side below the ribs. It continued for a week and she vomited repeatedly immediately after taking food. There was no blood in the material vomited. Her bowels were open daily. The pain ceased gradually, and for a time she was able to go about her work, apparently in her usual health.

She was obliged to leave off wearing stays in August, and she then became aware of a swelling in the left side of her abdomen, and about this time she had a return of pain and sickness, which continued until her admission to the hospital. The pain had become increasingly severe.

Past History.—Rheumatic fever at 26 years of age, which left her completely blind for six months. She is the mother of ten children, the youngest being 9 years old. The menopause occurred four years since.

Present Condition.—The patient was a thin, sallow-complexioned woman, with a temperature of 98° F. and a pulse of 96, who says that she has been losing flesh lately.

The abdomen contained a large and solid tumour, extending as high as the left costal margin and downwards as low as the anterior superior spine of the ilium, backwards into the loin and beyond the middle line in front. The swelling is tense and smooth, except for an irregular surface just below and 3 inches to the left of the umbilicus. It was painless except for a single tender spot at the level of the umbilicus and about 4 inches to its left side. The lump was dull everywhere, and it did not appear to have any connection with the pelvic organs. The urine was clear, dark in colour; specific gravity, 1026; no albumin or sugar. It contained a few phosphates, and only 24 ounces were passed in the course of twenty-

four hours. There were no abnormal constituents detected on microscopical examination.

The tumour was stated to be neither renal nor pelvic, and it was assumed provisionally to be splenic in origin.

An incision was made vertically over the swelling for about 6 inches on November 6, 1905, and a large tumour was found inside the peritoneal cavity covered by the omentum, which was adherent to it. The tumour proved to be the spleen. The splenic artery was much enlarged; it was tied in two places and divided between the ligatures; the branches of the splenic vein were then treated in a similar manner. The tumour was removed without difficulty and was found to weigh 66 ounces. An accessory spleen was present, but it was left untouched as it did not seem to be affected. Several pieces of omentum which were involved in the growth were removed, and numerous enlarged lymphatic glands were scraped away with a sharp spoon as it was found impossible to remove them by dissection. The omentum was thoroughly examined and washed, the peritoneum was irrigated with saline solution at a temperature of 115° F. and the abdomen was closed after the insertion of a single drainage tube. The operation was well borne, and the patient had a pulse of 112 when she left the operating table.

The recovery was quite uneventful. There was no swelling of the lymphatic glands or pain in the limbs after the operation, and she was discharged from the hospital on December 9, 1905. No examination of the blood was made before the operation, but five days later there was a leucocytosis of 18,000 per cm., which had diminished to 8400 one month later.

Pathology.—Subsequent examination showed that the spleen was the seat of a primary sarcomatous new growth which had undergone extensive necrosis. The lower two-thirds of the organ presented a globular enlargement, and over the whole of this area, with the exception of a small part of the lowest extremity, the splenic tissue was replaced by a whitish new growth. A microscopical examination showed the growth to be a round-celled sarcoma.

The presence of the accessory spleen made it impossible to determine the effect upon the blood of the removal of the main organ, but the successive differential blood counts showed no change of importance in the number or variety of the corpuscular elements.

The patient went home and was able to attend to her household duties for a few weeks. She then failed gradually, and died on May 8, 1906, just six months after the operation.

The case is exceptionally interesting on account of its rarity. Dr. Bessel-Hagen (*Arch. f. Clin. Chir.*, bd. lxii. (1900), p. 199) states that five cases of splenectomy for primary sarcoma were recorded up to the year 1890, of which three recovered and two died. Four cases were recorded between 1891 and 1900, of which three were cured and one died. Dr. J. Collins Warren operated upon a case in the Massachusetts General Hospital in 1899 (*The Annals of Surgery*, vol. xxxiii. (1901), p. 522), but the patient unfortunately died. Dr. Simon (*Beitraege zur Klin. Chir.*, bd. liii. (1902), p. 318) gives details of a successful case which occurred in the practice of Professor Carré at Königsberg. Dr. Willy Meyer reports a case in February 1906. Dr. G. B. Johnston (*The Annals of Surgery* (July 19, 1908), p. 62) believes that this was not a case of primary sarcoma, as there were evidences of sarcomatous masses in other parts of the abdomen. This patient recovered from the operation, and was in good health two months later.

Ruptured Spleen.

I have had three cases of lacerated spleen under my care. Two patients recovered and one died.

CASE III.—*Laceration of the Spleen—Operation—Recovery.*

The first case was a boy, aged 16, who was admitted into St. Bartholomew's Hospital on September 18, 1900, at 2.30 P.M., saying that he had been "winded" by a horse which had kicked him in the stomach whilst he was feeding it. He was in great pain when I saw him, the respirations were quick and shallow, and his abdominal muscles were rigid. No bones were broken, and there was no sign of abdominal bruising except a superficial graze just to the left of the ensiform cartilage. The pulse was 110.

The patient passed a fairly good night, sleeping with his thighs flexed upon his abdomen. His condition on the following day gave no cause for special anxiety, except that he did not rally completely from the shock. His temperature was 98.4° F., his respirations were shallow, his pulse was rapid but regular, and his abdominal muscles remained rigid. He again slept well all night, and on the following day, September 19, his temperature was 100.6° F., his respirations were quick and shallow, and his pulse was 92. At mid-day he suddenly became worse; he vomited; his pulse rose to 120, and his abdomen began to swell; when I saw him it was rigid and

motionless, the liver dulness had disappeared, and the flanks were dull.

I opened his abdomen in the middle line without delay. Pure blood issued from the peritoneal cavity, slowly at first, but in a full and dark-coloured stream as soon as the intestines were disturbed. The intestines and left kidney seemed uninjured, but on passing my finger upwards I felt a laceration at the lower and inner part of the spleen. I cut down upon the spleen in the left hypochondrium and carefully plugged the splenic area with thymol gauze, a very moderate amount of pressure being sufficient to stop the bleeding. The first wound was closed, and the patient was sent back to bed with a firm bandage round his abdomen. The plugging was allowed to remain for seventy-two hours, when it was removed under an anæsthetic, and the wound was closed with silk sutures. The patient made an absolutely uneventful recovery. The wounds were soundly healed on October 15 without any bulging, but for the sake of precaution he was fitted with an abdominal belt. He left the hospital on October 20, and we have not been able to find any trace of him since.

The successful issue of this case led me into disaster in the next ruptured spleen which came under my care.

CASE IV.—*Laceration of the Spleen—Death.*

The patient was a man aged 23, who was climbing on the seat of a railway van when his horses moved, and he was thrown down so that the wheels passed over his abdomen. He was admitted to the hospital on November 12, 1900, within half-an-hour of the accident. He was suffering from shock at the time of his admission to St. Bartholomew's Hospital, but he quickly rallied, and complained of great pain in the upper part of his abdomen. His pulse was 82, and regular. The abdomen moved during respiration, and was resonant with a normal liver dulness. There was no bruising externally, but the abdomen was very tender in the epigastric and hypochondriac regions. My house surgeon did not consider the case serious, and he only asked me to look at it four hours afterwards when I had been summoned to operate upon another patient. The pulse was then more rapid than it had been at the time of admission, and it had become irregular. The patient appeared to be so collapsed and to be in such pain that I ordered him to be taken straight to the operating theatre, where I explored his abdomen through a median incision made above the umbilicus. There was a gush of blood from the

peritoneal cavity as soon as the intestines were disturbed. The blood was distinctly venous in character, and as it seemed to come from the left side, I explored the spleen at once. It could easily be felt, softened and torn. I therefore made a second incision, 2 inches in length, through the left linea semilunaris, and packed the injured spleen with strips of thymol gauze just as I had done in the previous case, afterwards closing the greater part of the wound. There was some hæmorrhage after the operation, but it did not seem to be severe, and the patient remained fairly well until 3 P.M. on the day after the operation, when the temperature rose suddenly to 102° F. At 9 P.M. he became very restless, and at 2.30 A.M. on November 14 he died. The autopsy showed that the peritoneal cavity contained several ounces of blood which had been recently effused. The blood had collected below the left dome of the diaphragm, and at the bottom of the pelvis. The lower third of the spleen was completely detached, and lay at the bottom of the pelvis on the left side. The rest of the spleen was much lacerated, and was surrounded by blood clot.

The ill success of this case made me determine to excise the spleen should another case of laceration come under my care in which there were signs of continued collapse or serious hæmorrhage into the peritoneal cavity.

CASE V.—Laceration of the Spleen—Removal—Recovery.

A boy, aged 7 years, was admitted into St. Bartholomew's Hospital under my care at 10.30 P.M. on May 12, 1908. A van weighing more than 2 tons was said to have run over his abdomen.

The patient was very collapsed when he was first seen. The pulse was 140, and irregular; the temperature 96°, and the respirations 34. His face was pale and his lips were blue; his body was cold, and he had passed fæces and urine involuntarily. He was very restless, and appeared to prefer lying upon his abdomen.

There was a bruise over the left side of his chest crossing the ninth, tenth, and eleventh ribs, which seemed to show that the wheel of the van had gone obliquely over him, and not directly across his abdomen. There were no ribs broken, and he had not sustained a fracture of any of the long bones. The abdomen was tender everywhere. It hardly moved during respiration, and the liver dulness had disappeared.

The boy was very restless all night, and the collapse persisted. He passed 2 ounces of urine free from blood, and he

vomited twice. His pulse became much worse at 6.30 A.M., and it remained imperceptible all day until 5 P.M. He then rallied; his pulse could be counted as beating 130, and his colour improved. He was ordered an enema, with good result, and he passed much flatus.

I saw him for the first time at 2 P.M. on May 14—forty hours after the accident. He was still collapsed, with a rigid and tender abdomen. It appeared evident that he was suffering from severe abdominal injury, and I determined, therefore, to make an exploration at all risks. Blood issued from the peritoneal cavity as soon as it was opened, and a very short examination was sufficient to show that the left lobe of the liver was torn but had stopped bleeding. The intestines were clearly uninjured, and nothing wrong could be felt with either kidney; but in exploring the left kidney the spleen was found to be badly lacerated. It was drawn up into the wound, and was then seen to be so entirely torn across at the hilum as to be only attached to the body by a thread of the gastro-splenic omentum. All bleeding had stopped, and subsequent examination of the spleen showed that many of the vessels were thrombosed. The lacerated pedicle was trimmed up, a few ligatures were applied, several ounces of blood-clot were removed from the peritoneal cavity, more especially in the left iliac region, a drainage tube was inserted, and the wound was closed.

The patient recovered slowly from his state of collapse, the tube was removed on the fifth day after the operation, and was followed by a wholly uneventful convalescence, the boy being discharged from the hospital on June 26—less than six weeks from the date of the accident.

These cases bear out the general knowledge that the operation of removing the spleen may be undertaken with good prospect of success, and the patient may afterwards lead a useful and happy life for many years. Vauverts in 1897 (*Thèse de doctorat*, Paris, 1897, and *Gazette des Hôpitaux*, 1898, p. 245) collected the records of 247 cases of splenectomy, from which it appeared that no less than 170 of the patients had recovered.

The immediate danger attending the operation lies in the hæmorrhage and in the number of adhesions rather than in the shock. The numerous and thin-walled veins are liable to be torn if they are treated roughly; but the operation presents no difficulties greater than those to which we are accustomed in the removal of an ovarian tumour or a hysterectomy.

The three cases of ruptured spleen were interesting, because

they resulted from direct violence with hardly so much as a bruise of the abdominal wall to show the serious injury which the patient had sustained. But the intense shock was a sufficient warning that there was something gravely wrong, though the exact seat of injury was doubtful until the abdomen was opened.

The last case shows the great power of coagulation which is possessed by the splenic blood, and our Pathological Museum at St. Bartholomew's Hospital shows that the spleen itself has great powers of repair, even when it has been extensively torn.

The specimen No. 2308a is the spleen of a woman who threw herself out of a second-floor window upon an alarm of fire. She fell a distance of 30 feet, and was admitted to the hospital unconscious, bruised, and with a simple fracture of the left thigh. She died exhausted ten weeks later.

The temperature of the patient remained subnormal on the second, third, and fourth days after her fall. It rose to 101.2° F. on the sixth day, after which it became subnormal until the fifteenth day, when it rose, and remained high until the death of the patient of cystitis and morbus cordis. She made no complaint of any abdominal injury throughout her illness.

At the autopsy the spleen was found to be torn upon its anterior and external surfaces. The rent passes quite through the organ, and involved the capsule. It is closed by a firm white scar measuring one-eighth of an inch in diameter. The outermost border of the spleen was soft and lacerable. It tore when it was separated from the clot which lay above it, and for this reason the specimen does not look as if it had undergone so great an amount of repair as had taken place in reality. The subperitoneal tissue was stained of a dark purple colour, evidently by an extravasation of blood which had occurred some time before death. There was also an encapsuled collection of blood which had remained fluid in great part and was situated immediately round the spleen.

The second specimen in the Museum of St. Bartholomew's Hospital (No. 2308b) also shows an excellent attempt at repair, as the rupture is closed by a firmly adherent clot. The spleen has been extensively torn on the outer surface and near the upper margin. It was removed from the body of a woman, aged 39, who had been run over by an omnibus in the City of London. She received other severe injuries, including a slight laceration of the right lobe of the liver, and died sixty hours after the accident. These two specimens make it probable that ruptured spleen is not quite so rare an accident in a large town

as would appear from the number of deaths which follow directly upon it.

Dr. G. B. Johnston, who has given the latest résumé of the results of operations upon the spleen, says (*The Annals of Surgery*, July 1908, p. 65) that he has been able to find the records of 708 operations upon the spleen with 514 recoveries and 194 deaths, a mortality of 27.4 per cent. In the period from 1900 to 1908 there are records of 355 splenectomies with 289 recoveries and 66 deaths, a mortality of 18.5 per cent. If the instances of removal of the spleen for traumatic affections of that organ be excluded, there remain 242 splenectomies with 210 recoveries and 32 deaths, a mortality of 13.2 per cent. The well-recognised contraindication to operation in leukæmia may furthermore serve to exclude the seven cases operated upon for this cause. There is then left a total of 235 splenectomies for diseases of the spleen, with 208 recoveries and 27 deaths, a mortality of 11.5 per cent.